

### **Food Science Questions- Cobra Science Olympiad Invitation**

Part 1: Impound your notebook (18 pts): 7:45-8:30am Prep Room between Lab 600-B & 600-C

Part 2: Lab task (22 pts): 30 minutes

Part 3: Written test (60 pts): 20 minutes

Total: 100 pts, 50 minutes

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Team Name: \_\_\_\_\_ Team Number: \_\_\_\_\_

Team Member Name(s): \_\_\_\_\_

School Name: \_\_\_\_\_

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Scores:

Part 1 \_\_\_\_\_

Part 2 \_\_\_\_\_

Part 3 \_\_\_\_\_

Total \_\_\_\_\_

Ranking \_\_\_\_\_

Team Name \_\_\_\_\_ Team Number \_\_\_\_\_ School Name \_\_\_\_\_

**Lab task: "Determine milk fat mass from cream" (30 mins; 22 pts)**

**Experimental Procedure: -- follow the procedure and record data in the blanks**

- (1) Pick up the cup containing cream (**unknown** volume of cream is provided in a cup with Team Number on it)

Cup # \_\_\_\_\_

- (2) Obtain the weight of 150 ml cream, and transfer 150 ml cream into bottle (triple-beam balance is provided)

Volume of cream transferred: \_\_\_\_\_

Weight of container: \_\_\_\_\_

Weight of container and 150 ml cream: \_\_\_\_\_

Weight of 150 ml cream: \_\_\_\_\_

- (3) Cap and shake the bottle with cream for 10 minutes (timer is provided)

Shaking time: \_\_\_\_\_

- (4) Set up filtration using cheesecloth; drain off liquid

- (5) Obtain the weight of fat (weigh with cheesecloth)

Weight of butter: \_\_\_\_\_

- (6) Place your product (fat on cheesecloth) in small plastic bag labeled with Team number, and hand to Supervisor at the end of lab time.

**Results and Analysis:**

Calculate the percentage of fat in cream. Show work below.

The percentage of fat in this cream is \_\_\_\_\_%.

Team Name \_\_\_\_\_ Team Number \_\_\_\_\_ School Name \_\_\_\_\_

**Written test (30 questions 20 minutes 60 pts):**

*Each blank or multiple choice question is 1pt unless noted*

(1) Milk and milk products sold in the U.S. are produced mostly from \_\_\_\_\_.

Almost 90% of the whole milk composition is \_\_\_\_\_. Name three other ingredients in milk:

1. \_\_\_\_\_;      2. \_\_\_\_\_;      3. \_\_\_\_\_.

(2) There are two types of proteins in milk: \_\_\_\_\_ and \_\_\_\_\_.

(3) Milk is \_\_\_\_\_ in color. The slight yellow color in butter and cream comes from \_\_\_\_\_.

(4) Lactose is a disaccharide consisting of a \_\_\_\_\_ molecule bonded to a \_\_\_\_\_ molecule.

(5) Most common commercial ways of milk pasteurization are high-temperature and short-time. Which one of the following time durations is most likely used?

A. 20 seconds;      B: 60 minutes;      C: 2 hours;      D: half-a-day

(6) Which one of the following statement is false for milk and milk products sold in U.S.?

A. The federal government requires minimum milk fat amounts.

B. All states in U.S. have the same rules for milk and milk products.

C. The federal government regulates processing conditions for pasteurization.

D. The federal government sets the maximum allowable bacterial counts.

(7) If you have milk allergy, you need to avoid milk and milk products. You can choose non-dairy milk products as alternatives. Name one non-dairy milk product:

\_\_\_\_\_.

(8) Fat is formed by glycerol and fatty acid through \_\_\_\_\_ bond.

(9) There are two basic types of food emulsions: (A) oil-in-water emulsion and (B) water-in-oil emulsion. Circle your answer: Cream is (A) or (B); Butter is (A) or (B).

(10) Lactose intolerance in people causes intestinal discomfort after consuming milk. It is because the body lacks the enzyme \_\_\_\_\_ to break down \_\_\_\_\_ in milk. Lactose intolerance is (circle one) A. the same; B. not the same as food allergy. People having lactose intolerance can consume dairy products low in lactose, such as

\_\_\_\_\_.

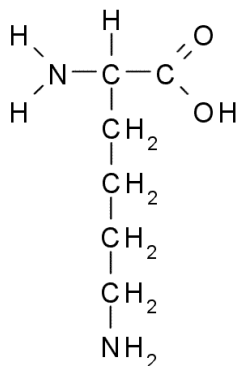
(11) Protein is consisted of amino acids connected through \_\_\_\_\_ bonds. There are two types of amino acids: essential and non-essential. The ones that your body can not synthesize are called (circle one) A. essential; B. non-essential amino acids. An example of essential amino acid is \_\_\_\_\_; and an example of non-essential amino acid is \_\_\_\_\_.

(12) Friendly bacteria from cultured dairy products can help maintain the health of intestinal tract. These live bacteria are called \_\_\_\_\_. They can reduce the growth of \_\_\_\_\_ in intestinal tract.

(13) Milk is a good source of these minerals (name three):

1. \_\_\_\_\_; 2. \_\_\_\_\_; 3. \_\_\_\_\_.

(14) The molecular structure of this amino acid \_\_\_\_\_ is shown below:

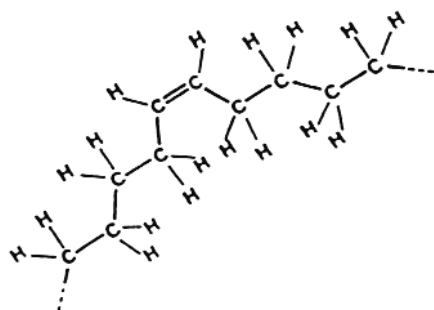


(2pts)

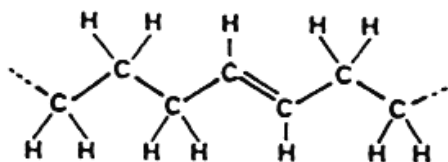
(15) Triglycerides consist of \_\_\_\_\_ fatty acids attached to a \_\_\_\_\_ - carbon glycerol molecule (fill in numbers).

(16) Trans fats are thought to increase the risk of coronary heart disease. Circle the structure below that you will find in trans fat (2pts):

A:

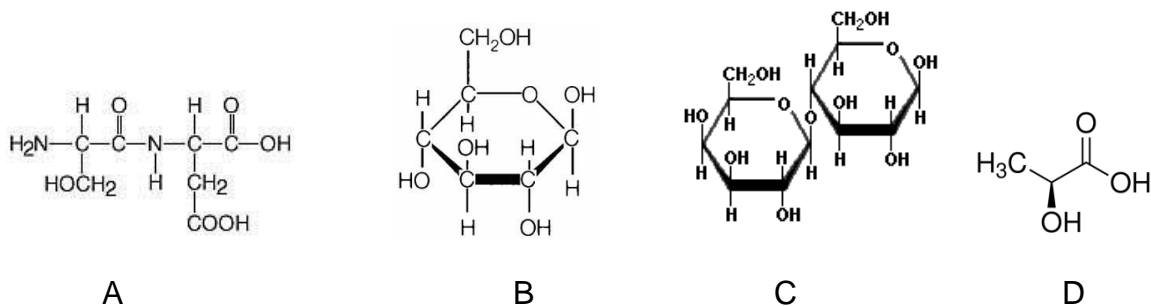


B:



(17) Enzymes that degrade fat in milk are called \_\_\_\_\_; and the process is called \_\_\_\_\_, a small amount of which is needed to achieve the characteristic flavor in blue cheese and provolone.

(18) Circle the structure of lactose below.



(19) FDA is the authority for the regulation of food labels. FDA is the abbreviation for \_\_\_\_\_ (2pts).

(20) In 1990, the NLEA became law, mandating nutritional labels on most foods. It also calls for activities to educate consumers on nutritional information on the label and how to use it to maintain healthy dietary practices. NLEA is the abbreviation for \_\_\_\_\_ (2pts).

(21) Circle the only false statement below:

- A. Vitamin A is only found in animals. It is required for vision;
- B. Vitamin C is a water-insoluble vitamin which can not be lost during cooking with heat.
- C. Vitamin D is necessary for normal tooth and bone formation.
- D. Vitamin E serves as an antioxidant that prevents oxidation of body components.

(22) The following questions are based on this nutritional label shown below:

Whole Milk	
Nutrition Facts	
Serving Size 1 cup (240mL/8fl.oz.)	
Amount Per Serving	
<b>Calories</b> 160	Calories From Fat 80
% Daily Value *	
<b>Total Fat</b> 9g	<b>14%</b>
Saturated Fat 6g	<b>30%</b>
<b>Cholesterol</b> 35mg	<b>12%</b>
<b>Sodium</b> 120mg	<b>5%</b>
<b>Total Carbohydrates</b> 11g	<b>4%</b>
Dietary Fiber 0g	<b>0%</b>
Sugars 11g	
<b>Protein</b> 8g	
Vitamin A 6%	• Vitamin C 0%
Calcium 30%	• Iron 0%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	

Ingredients: Whole Milk.

(22a) Calculate the Daily Value of cholesterol: \_\_\_\_\_ (2pts);

(22b) Calculate the calories from Protein in 2 cups of whole milk: \_\_\_\_\_ (2pts);

(22c) Which one of the following statements is true for setting the “Serving Size” in this label? (2pts)

- A. There is no regulation for selecting serving size;
- B. The food manufacturer sets the serving size based on the package size of milk;
- C. The serving size is set close to the amounts of food normally consumed per eating occasion;
- D. The serving size on the label is the same as the one on the label of dry milk powder.

(23) "Fat-free" on the food label usually means fat is \_\_\_\_\_  
per serving.

(24) Plain water freezes at the temperature of \_\_\_\_\_. When you add salt to ice,  
the freezing point of water (circle only one of the following choices):

A. increases;      B. decreases;      C. stay the same;      D. is hard to tell.

(25) When you perform the lab task "Determine curd mass", the most crucial step for the  
curd formation is (2pts):

A. stirring time;      B. sitting time;      C: filtering time;      D. adding lemon juice.

(26) After the curd is form, you set up the filtration with cheesecloth and beaker. The  
clear liquid in the drain is a little greenish. This color comes from \_\_\_\_\_,  
which is also a heat stable vitamin that is not affected by severe heat treatments.

(27) Most cheese are produced from milk using bacteria. This is accomplished when  
bacteria ingest \_\_\_\_\_ and convert it into \_\_\_\_\_.

(28) If the milk fat in the cream is 4%, this cream is most likely:

A: fat-free milk;      B: heavy cream;      C: whole milk;      D: Half & Half

(29) Upon heating during cooking, proteins may lose their biological activity and  
solubility. This process is called \_\_\_\_\_.